SB761
U7R6
76-12

Forest Insect and Disease Management

5230
BIOLOGICAL
EVALUATION R2-76-12

RAWLINS DISTRICT

Bureau of Land Management

Green Mountains, Wyoming

JULY 1976

Rocky Mountain Region

U.S. Department of Agriculture Forest Service

LIBRARY
DEC 10 1976
ROCKY MOUNTAIN STATION

5230
BIOLOGICAL
EVALUATION R2-76-12

RAWLINS DISTRICT

Bureau of Land Management

Green Mountains, Wyoming

JULY 1976

PREPARED BY: Donn B. Cahill

DONN B. CAHILL
Entomologist

David W. Johnson

DAVID W. JOHNSON
Plant Pathologist

APPROVED BY:

A L Downing

G. L. DOWNING
Staff Director
Forest Insect and Disease Management

F. A. Dorrell

F. A. DORRELL
Deputy Regional Forester
State and Private Forestry

INTRODUCTION

An area encompassing over 13,000 acres in the Green Mountains of Wyoming, south of Jeffrey City, is being considered for management activities by the Bureau of Land Management. The area consists mainly of old growth lodgepole pine, Pinus contorta var. latifolia Doug. and limber pine, P. flexilus James, age to 240 years. Many stands are infested with mountain pine beetle, Dendroctonus ponderosae Hopk., and lodgepole pine dwarf mistletoe, Arceuthobium americanum (Nutt. ex Engelm.).

The major concern of the land manager is how to harvest the old-growth lodgepole stands with means commensurate with good forestry and minimize the visual impact associated with harvesting practices. Without management, most of the volume will be lost to insects and diseases; thus harvest and regeneration to healthy, vigorous stands is needed to conserve the resource.

On November 24, 1975 Donn Cahill, (Entomologist) made a field appraisal of the area for mountain pine beetle. During this trip he also noted several disease problems and suggested that a pathologist accompany him on a follow-up evaluation.

A second appraisal of the insect and disease situation was made on June 16, 1976 by Donn Cahill, Dave Johnson (Plant Pathologist) and Dr. Frank Hawksworth (Project Leader - RMFRES) and reported July 8, 1976 (reference - Service Trip Appraisal Report 76-6). Bureau of Land Management personnel Bob Berg (Rawlins District Office) and Ken Johnson (Lander Resource Area) accompanied Donn, Dave and Frank.

During this trip, tumors of an unknown cause were noted throughout the stands. One stand adjacent to Round Park (located in T. 27 N., R. 91 W., Sec. 4) contained numerous tumored lodgepole pine and limber pine. All ages of trees were affected. Tumors occurred singly, but usually were grouped along trunks and branches (Figures 1 and 2). Hundreds of tumors were noted on many trees (Figure 3). No obvious mortality was associated with the tumors; however, trees were deformed and future utilization will be adversely affected. Lodgepole pine dwarf mistletoe, Comandra rust, Cronartium comandrae PK., and mountain pine beetle were also present throughout the stands (Figure 4).

At this time it was recommended that a survey be conducted in the area to gather more detailed stand, insect and disease information.

FIGURE 1

Tumors of an unknown cause grouped along the trunk of a lodgepole pine sapling.

FIGURE 2

Older tumors of an unknown cause on a pole-size lodgepole pine.

FIGURE 3

Old growth lodgepole pine infected with numerous tumors. Dwarf mistletoe present in adjacent trees.

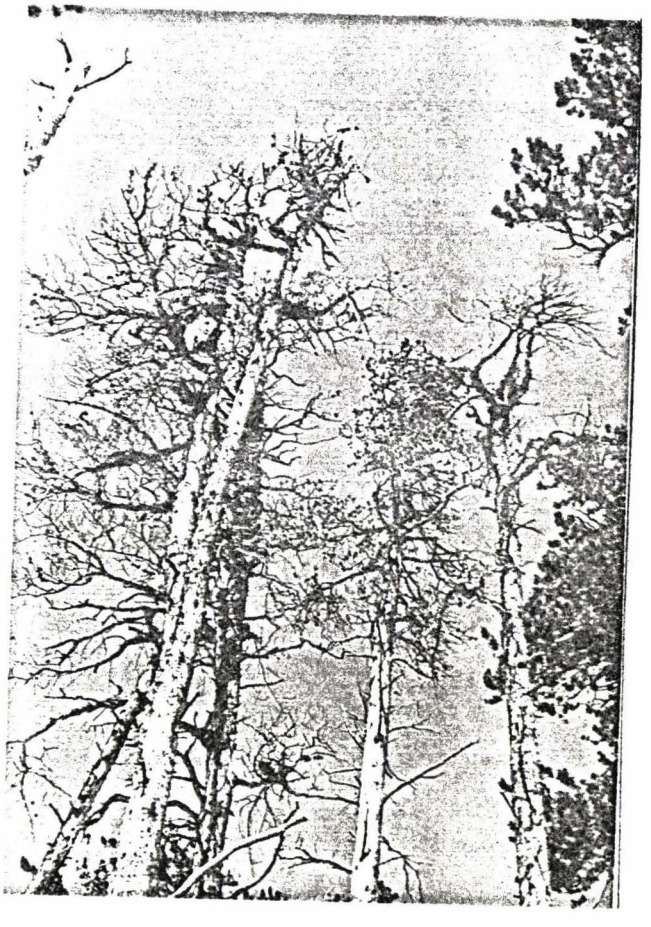

FIGURE 4

Group of old-growth lodgepole pine killed by mountain pine beetle.

SURVEY PROCEDURE

During the week of July 19, 1976 Forest Insect & Disease Management biological technicians, Vincent Pace and Kent Eggleston conducted a stand survey in four different areas to determine the incidence of various insect and disease agents in the stands. The survey included stands near Round Park, Little Long Park, Sagebrush Park and East Cottonwood Park (T. 28 N., R. 91 W., Sec. 32, 33; T. 27 N., R. 91 W., Sec. 3 & 4) (See map).

Variable radius plots (10 BAF) were taken at 2 chain intervals. All plot trees were measured for d.b.h., insect and disease damage. All live and beetle-infested trees were rated for dwarf mistletoe infection (DMR) using Hawksworth's 6-class rating.

RESULTS

The results of the survey are presented in Tables 1 - 4. Mountain pine beetle was noted in 47 percent of the B.A. along Rim Road Survey Line (see map and Table 4); 93 percent of trees/acre were infected with dwarf mistletoe (average DMR was 5.0). Tumors were noted on 56 percent of the trees/acre. Comandra rust was light, only 3 percent of trees/acre were infected. Mortality had occurred in 38 percent of the trees per acre (Table 4).

Mountain pine beetle activity was not observed on the other survey lines; however, dwarf mistletoe rating ranged from 4.3 to 5.9; infected trees/acre ranged from 77 to 95 percent. Trees infected/acre with tumors ranged from 2 percent (Green Mountain Survey Line #2) to 70 percent (Round Park Survey Line). Comandra rust was highest along Green Mountain Survey Line #1, 20 percent of trees/acre.

DISCUSSION AND RECOMMENDATIONS

The most interesting problem noted in the Green Mountain area is the tumor. Similar appearing tumors were reported on lodgepole pine, limber pine, Douglas-fir and subalpine fir by Peterson in 1961.[1/]

1/ Peterson, R. S. 1961. Conifer tumors in the Central Rocky Mtns. Plant Disease Reporter 45 (6):472-474.

Tumors consist of modified xylem extending near the pith to the cambium in a conical zone. No discoloration or decay was noted behind the deformations.

Insects are suspected as initiating the damage; however, this hypothesis has not been confirmed. Additional research is needed to determine the causal agent and also to define the impact of the problem in newly regenerated stands adjacent to infested areas.

The nature of the stands in this area is such that partial cutting should be avoided in most instances since dwarf mistletoe will spread to any regeneration at a faster rate. The best management approach would be to clearcut in patches at least 20 acres in size. Cut boundaries could be contoured to lessen the visual impact.

Mountain pine beetle will continue to be a problem in a few areas; however, two major climatic factors will tend to limit the extent of the infestation. According to Amman and others 1/ (1976) the susceptibility of lodgepole pine stands to the beetle can be determined by considering elevation and latitude. With increased elevation, losses to the beetle decline, primarily because of the colder climate and it's effects on population development. Green Mountain is located at latitude 42° 30'N. According to Amman, at this latitude and elevation (see map) light to moderate mortality is predicted for trees 9 inches dbh (8.5 - 9.4 inch) and larger.

It also is expected that mountain pine beetle activity will lessen as the stands are put under management. Until that goal is achieved both dwarf mistletoe and mountain pine beetle will continue to cause a greater loss in volume than is gained through additional increment.

1/ Amman, G. D., M. D. McGregor, D. B. Cahill, and W. H. Klein. 1976. Guidelines for reducing losses of lodgepole pine to the mountain pine beetle in the central and northern Rocky Mountains. USDA, Forest Service. Intermountain Forest and Range Experiment Station Manuscript (In preparation). 22 pp.

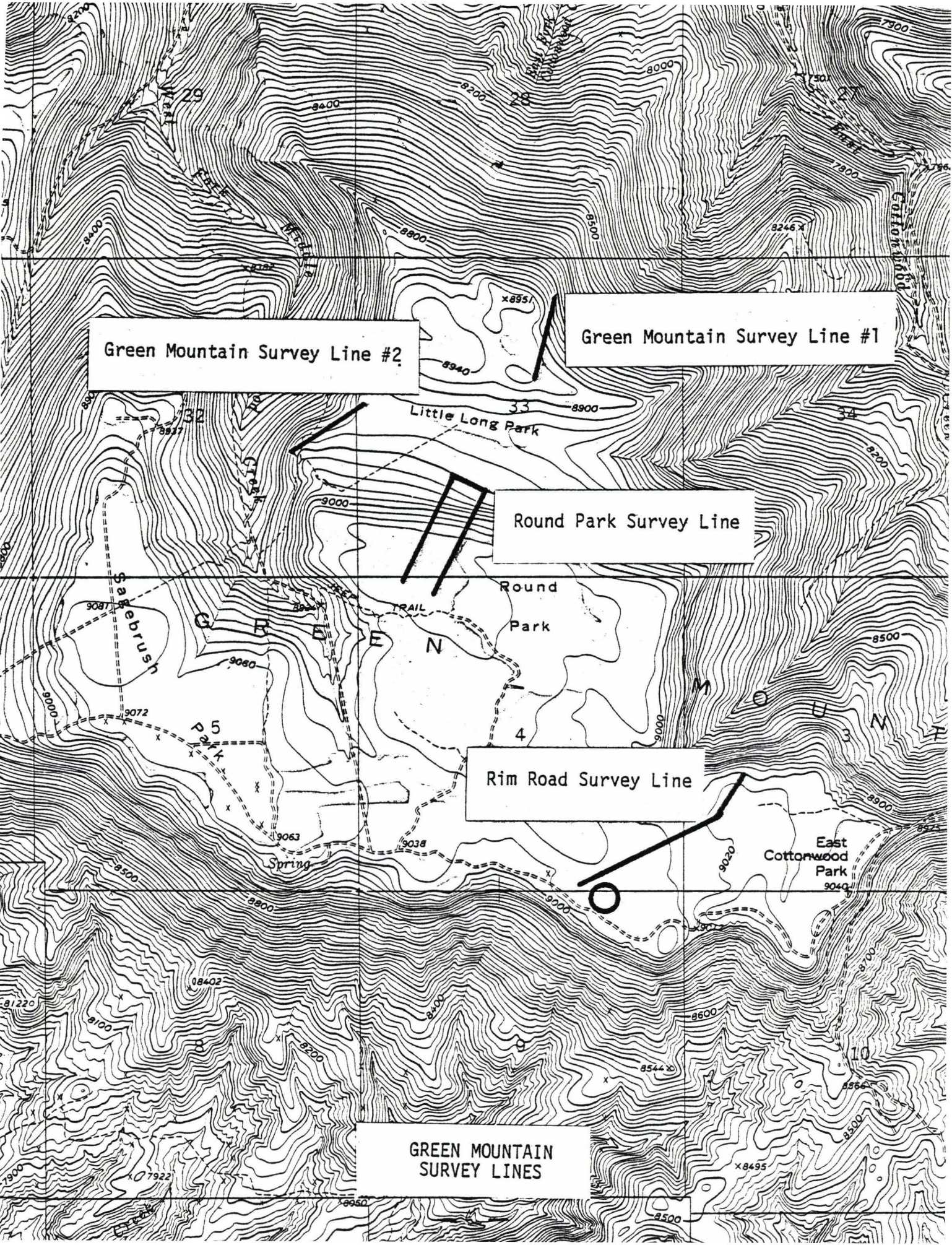
Green Mountain Survey Line #2
Green Mountain Survey Line #1
Round Park Survey Line
Rim Road Survey Line
GREEN MOUNTAIN
SURVEY LINES
Little Long Park
Round
Park
Sagebrush
Park
Spring
East
Cottonwood
Park
TRAIL
Mt Baldy
Cottonwood
Creek
Creek
Creek
28
29
32
33
34
3
4
5
9
10
8951
8246
8495
8544
9081
9072
9080
9063
9038
9020
9040
8937
8402
7922

TABLE 1 GREEN MOUNTAIN SURVEY LINE #1

Ave. DMR = 4.33
8 Plots

Diameter Class (Inches)	Lodgepole Pine Total Trees No.	Total Trees T/A	Live Trees No.	Live Trees T/A	Comandra Rust No.	Comandra Rust T/A	Tumors No.	Tumors T/A	Dwarf Mistletoe No.	Dwarf Mistletoe T/A	Rust/ Tumors No.	Rust/ Tumors T/A	Rust/DM No.	Rust/DM T/A	Tumors/DM No.	Tumors/DM T/A	Rust/ Tumors/DM No.	Rust/ Tumors/DM T/A
5	2	15.19	2	15.19	1	7.59												
6	3	16.26	3	16.26	1	5.42	1	5.42	2	10.84			1	5.42	1	5.42		
7	4	16.36	4	16.36					3	12.27			1	4.09				
8	5	15.88	5	15.88	1	3.18	1	3.18	5	15.88			1	3.18	1	3.18		
9	6	15.23	6	15.23					6	15.23								
10	4	8.30	4	8.30	1	2.07			3	6.22			1	2.07				
11	6	10.41	6	10.41	1	1.74			6	10.41			1	1.74				
12	6	8.80	6	8.80	1	1.47	2	2.93	6	8.80			1	1.47	2	2.93		
13	9	11.34	9	11.34	3	3.78	1	1.26	8	10.08			2	2.52	1	1.26		
14	6	6.55	6	6.55	1	1.09			4	4.37			1	1.09				
15	1	.95	1	.95					1	.95								
16	1	.84	1	.84					1	.84								
17	2	1.50	2	1.50					2	1.50								
18	3	2.01	3	2.01					3	2.01								
19	2	1.21	2	1.21					2	1.21								
20	0	0.00	0	0.00														
21	1	.50	1	.50			1	.50	1	.50					1	.50		
T/A	61	131.33	61	131.33	10	26.34	6	13.29	53	101.11	0	0.00	9	21.58	6	13.29	0	0.00
% T/A		100.00		100.00		20.06		10.12		76.99		0.00		16.43		10.12		0.00
BA		76.25		76.25		12.50		7.50		66.25		0.0		11.25		7.50		0.0
% BA		100.00		100.00		16.39		9.84		86.88		0.00		14.75		9.84		0.00
Ave. DBH		9.27		9.27		8.29		9.03		10.01		0.0		8.90		9.03		0.0

TABLE 2 GREEN MOUNTAIN SURVEY LINE #2

Ave. DMR = 5.85
8 Plots

Diameter Class (Inches)	Lodgepole Pine: Total Trees No.	Total Trees T/A	Live Trees No.	Live Trees T/A	Comandra Rust No.	Comandra Rust T/A	Tumors No.	Tumors T/A	Dwarf Mistletoe No.	Dwarf Mistletoe T/A	Rust/DM No.	Rust/DM T/A	Tumors/DM No.	Tumors/DM T/A	Limber Pine: Live Trees No.	Live Trees T/A	Tumors No.	Tumors T/A
5	1	7.59	1	7.59					1	7.59								
6	0	0.00	0	0.00					0	0.00								
7	1	4.09	1	4.09					1	4.09								
8	4	12.71	3	9.53	2	6.35			3	9.53	2	6.35			1	3.18	1	3.18
9	3	7.61	3	7.61					3	7.61								
10	10	20.74	9	18.66			1	2.07	9	18.66			1	2.07	1	2.07		
11	9	15.62	9	15.62					9	15.62								
12	4	5.87	4	5.87					4	5.87								
13	8	10.08	8	10.08	2	2.52			8	10.08	2	2.52						
14	4	4.37	4	4.37					4	4.37								
15	5	4.77	5	4.77					5	4.77								
16	1	.84	1	.84					1	.84								
17	3	2.25	3	2.25					3	2.25								
18	1	.67	1	.67					1	.67								
19	1	.60	1	.60					1	.60								
20	0	0.00	0	0.00					0	0.00								
21	1	.50	1	.50					1	.50								
T/A	56	98.31	54	93.05	4	8.87	1	2.07	54	93.05	4	8.87	1	2.07	2	5.25	1	3.18
% T/A		100.00		94.65		9.02		2.11		94.65		9.02		2.11		5.34		3.23
BA		70.00		67.50		5.00		1.25		67.50		5.00		1.25		2.50		1.25
% BA		100.00		96.43		7.14		1.79		96.43		7.14		1.79		3.57		1.79
Ave. DBH		10.54		10.64		9.42		10.00		10.64		9.42		10.00		8.74		8.00

TABLE 3 ROUND PARK SURVEY LINE

Ave. DMR = 5.47
14 Plots

Diameter Class (Inches)	Lodgepole Pine Total Trees No.	T/A	Live Trees No.	T/A	Comandra Rust No.	T/A	Tumors No.	T/A	Dwarf Mistletoe No.	T/A	Rust/ Tumors No.	T/A	Rust/DM No.	T/A	Tumors/DM No.	T/A	Rust/ Tumors/DM No.	T/A
5	2	8.68	2	8.68					2	8.68								
6	2	6.20	2	6.20			1	3.10	2	6.20					1	3.10		
7	5	11.68	5	11.68	1	2.34	4	9.35	4	9.35					4	9.35		
8	10	18.15	10	18.15	1	1.82	5	9.08	6	10.89			1	1.82	5	9.08		
9	18	26.10	18	26.10	1	1.45	14	20.30	18	26.10	1	1.45	1	1.45	14	20.30	1	1.45
10	16	18.96	16	18.96	1	1.19	12	14.22	16	18.96	1	1.19	1	1.19	12	14.22	1	1.19
11	24	23.79	24	23.79	1	.99	23	22.80	24	23.79	1	.99	1	.99	23	22.80	1	.99
12	31	25.97	31	25.97	2	1.68	24	20.11	30	25.14	1	.84	2	1.68	24	20.11	1	.84
13	24	17.28	24	17.28	2	1.44	16	11.52	22	15.84	2	1.44	2	1.44	16	11.52	2	1.44
14	14	8.73	14	8.73			11	6.86	14	8.73					11	6.86		
15	8	4.36	8	4.36			4	2.18	7	3.82					4	2.18		
16	7	3.37	7	3.37			5	2.40	7	3.37					5	2.40		
17	2	.86	2	.86	1	.43	2	.86	2	.87	1	.43	1	.43	2	.86	1	.43
18	3	1.15	3	1.15			2	.77	3	1.15					2	.77		
T/A	166	175.28	166	175.28	10	10.91	123	123.55	157	162.88	7	5.91	9	8.57	123	123.55	7	5.91
% T/A		100.00		100.00		6.22		70.49		92.93		3.37		4.89		70.49		3.37
BA		118.57		118.57		7.14		87.86		112.14		5.00		6.43		87.86		5.00
% BA		100.00		100.00		6.02		74.10		94.80		4.22		5.42		74.10		4.22
Ave. DBH		10.31		10.31		9.96		10.68		10.41		11.34		10.73		10.68		11.34

TABLE 4

RIM ROAD SURVEY LINE

Ave. DMR = 5.04

7 plots

Lodgepole pine

Diameter Class (Inches)	Total Trees No.	Total Trees T/A	Live Trees No.	Live Trees T/A	Dead Trees No.	Dead Trees T/A	Total MPB No.	Total MPB T/A	Currently Infested No.	Currently Infested T/A	Infested Previously No.	Infested Previously T/A	Comandra Rust No.	Comandra Rust T/A	Tumors No.	Tumors T/A	Dwarf Mistletoe No.	Dwarf Mistletoe T/A	MPB / DM No.	MPB / DM T/A	MPB/Tumors No.	MPB/Tumors T/A	Rust/Tumors No.	Rust/Tumors T/A	Tumors / DM No.	Tumors / DM T/A	Rust/ Tumors/DM No.	Rust/ Tumors/DM T/A
6	6	37.17	6	37.17											3	18.59	6	37.17							3	18.59		
7	8	37.38	7	32.71	1	4.67									2	9.35	6	28.04							2	9.35		
8	11	39.93	8	29.04	3	10.89	3	10.89	2	7.26	1	3.63			5	18.15	10	36.30	2	7.26					5	18.15		
9	30	87.00	21	60.90	9	26.10	9	26.10	8	23.20	1	2.90	1	2.90	17	49.30	30	87.00	9	26.10	7	20.30	1	2.90	17	49.30	1	2.90
10	14	33.18	5	11.85	9	21.33	9	21.33	8	18.96	1	2.37	0	0.00	10	23.70	13	30.81	8	18.96	7	16.59			9	21.33		
11	22	43.62	10	19.83	12	23.79	11	21.81	4	7.93	7	13.88	1	1.98	15	29.74	18	35.69	7	13.88	7	13.88			14	27.76		
12	12	20.11	5	8.38	7	11.73	7	11.73	4	6.70	3	5.03	0	0.00	10	16.76	12	20.11	7	11.73	5	8.38			10	16.76		
13	9	12.96	3	4.32	6	8.64	6	8.64	6	8.64	0	0.00	1	1.44	5	7.20	9	12.96	6	8.64	3	4.32			5	7.20		
14	6	7.48	2	2.49	4	4.99	4	4.99	3	3.74	1	1.25	1	1.25	5	6.24	6	7.48	3	3.74	3	3.74			5	6.24		
15	12	13.08	0	0.00	12	13.08	11	11.99	4	4.36	7	7.63	0	0.00	5	5.45	10	10.90	10	10.90	5	5.45			5	5.45		
16	6	5.77	3	2.88	3	2.88	3	2.88	2	1.92	1	.96	2	1.92	2	1.92	6	5.77	3	2.88	1	.96	1	.96	2	1.92	1	.96
17	4	3.42	2	1.71	2	1.71	2	1.71	2	1.71			0	0.00	3	2.57	4	3.42	2	1.71	2	1.71			3	2.57		
18	3	2.30	1	.77	2	1.53	2	1.53	2	1.53			1	.77	3	2.30	3	2.30	2	1.53	2	1.53	1	.77	3	2.50	1	.77
19	1	.69			1	.69	1	.69	1	.69					1	.69	1	.69	1	.69	1	.69			1	.69		
T/A	144	344.09	73	212.05	71	132.03	68	124.29	46	86.64	22	37.65	7	10.26	86	191.96	134	318.64	50	108.02	43	77.55	3	4.63	84	187.61	3	4.63
% T/A		100.00		61.63		38.37		36.12		25.18		10.94		2.98		55.79		92.60		31.39		22.54		1.34		54.52		1.34
BA		205.71		104.29		101.43		97.14		65.71		31.43		10.00		122.86		191.43		85.71		61.42		4.29		120.00		4.29
% BA		100.00		50.70		49.31		47.22		31.94		15.28		4.86		59.72		93.06		41.67		29.86		2.09		58.33		2.09
Ave. DBH		4.63		8.72		11.09		11.21		11.02		11.67		12.54		10.17		9.65		11.29		11.31		11.95		10.01		11.95